



## LEED AND ENERGY STAR BUILDING CERTIFICATIONS

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### QUICK FACTS

- The Energy Star program was established under the federal Clean Air Act's directive for the EPA to ["conduct a basic engineering research and technology program to develop, evaluate, and demonstrate non-regulatory strategies and technologies for reducing air pollution."](#) Through the end of 2013, it has certified over 23,000 buildings and plants representing over 3 billion square feet of space.
- The [USGBC](#) was founded in 1993 by representatives from approximately 60 firms and nonprofit organizations. It currently has 76 chapters, 13,000 member companies and organizations, and over 181,000 LEED-credentialed professionals.

### QUESTION

What is the difference between the Energy Star and Leadership in Energy and Environmental Design (LEED) certifications for buildings, including their potential financial costs and benefits?

### SUMMARY

Energy Star is a program developed by the U.S. Environmental Protection Agency (EPA) that, among other things, promotes energy efficiency in consumer products and buildings. The Energy Star certification for buildings focuses on measuring a building's energy usage and comparing it to similar buildings. EPA awards Energy Star certification to certain types of buildings that earn an Energy Star score of at least 75 out of 100. This score indicates that the building is among the top 25% most energy efficient buildings of its type. Although Energy Star certification requires at least 12 months of a building's operational energy data, EPA also offers a "Designed to Earn the Energy Star" designation for new construction projects based on a new building's estimated energy usage.

The LEED program is a building certification process developed and administered by the U.S. Green Building Council (USGBC) that aims to improve a building's performance across a variety of "green" areas, including energy efficiency. Eligible building projects must meet various prerequisites, such as complying with certain energy efficient engineering standards, and can earn additional points by

implementing other green measures. The prerequisites and optional measures cover energy efficiency and several other areas, such as water management, material and resource use, and indoor air quality. A project's certification level depends on how many optional points the project accumulates.

While both certifications promote greater energy efficiency in buildings, LEED certification also includes a broad array of measures that may provide environmental benefits beyond increased energy efficiency. Because of this, it appears that the LEED certification may be generally more difficult to obtain than Energy Star certification. While Energy Star rewards a building's energy efficiency, it does not prescribe specific engineering or design measures that the building must use. Certification is ultimately determined by a building's energy use or projected energy use, relative to similar buildings. In comparison, LEED requires new building projects to meet specific energy efficient engineering standards during construction. For existing buildings, LEED requires a building to qualify for Energy Star certification as a prerequisite. LEED also requires various other measures that would not necessarily fall within Energy Star's focus on energy efficiency (e.g., indoor air quality measures).

Due to their differences, it is difficult to directly compare the total financial costs and benefits of Energy Star versus LEED certification. Because both certifications allow for significant variability, the costs and benefits of either would depend on an individual project's specifics. Although we were unable to find any definitive third-party studies that compared the costs of achieving the two certifications, presumably, pursuing LEED certification would typically cost more than Energy Star certification simply because LEED certification includes requirements that are outside Energy Star's scope. For commercial buildings, however, the increased cost of pursuing LEED certification over Energy Star certification may result in larger financial returns. A 2008 study found that while both certifications led to increased rents, higher occupancy rates, and higher sales prices, LEED certified buildings outperformed Energy Star building in each of these categories. However, buildings that are not intended to be rented out or resold (e.g., government buildings) may not see these financial benefits.

## **ENERGY STAR CERTIFICATION**

The EPA established the Energy Star program in 1992. While the program initially focused on promoting energy efficiency in consumer products, in the mid-1990s it partnered with the U.S. Department of Energy (DOE) and expanded into certifying buildings. The first commercial building received an Energy Star certification in

1999 and, according to the [agency](#), over 23,000 buildings and plants representing more than 3 billion square feet of space have earned Energy Star certification through 2013.

To determine a building's eligibility, the EPA rates a building's energy efficiency on a scale of 1 to 100, with 100 being the best possible score. The rating represents the building's efficiency in comparison to similar buildings. Thus, a score of 80 indicates that a building is more energy efficient than 80% of similar buildings. To earn an Energy Star certification, a building must score a 75 or better (i.e., be more energy efficient than at least 75% of similar buildings).

### ***Energy Star Portfolio Manager***

To determine a building's energy efficiency score, the EPA uses an online tool called "[Portfolio Manager](#)" which tracks and measures a building's energy and water consumption and greenhouse gas emissions. To use Portfolio Manager, a building owner or operator must first identify the building's [property type](#) from among 17 different categories such as banking/financial services, healthcare, office, and public services. The owner or operator must then identify the specific type of building from within the category. For example, a building in the healthcare category can be a hospital, medical office, outpatient rehabilitation/physical therapy facility, senior care community, urgent care/clinic/other outpatient facility, or other/specialty hospital.

After choosing the appropriate property type, the owner/operator must enter specific information about the property (e.g., operating hours and number of employees) and monthly energy and water usage statistics. Portfolio Manager can then analyze and track over 100 different metrics that [benchmark](#) the building's performance over time and against national medians and similar buildings, among other things.

### ***Certification Eligibility & Application***

Not all buildings that can be benchmarked with Portfolio Manager can qualify for Energy Star certification. Although Portfolio Manager recognizes over 80 property types, only 20 of them can be certified (non-eligible properties can still use Portfolio Manager to benchmark and track their own performance). The eligible property types are: bank branches, barracks, financial offices, K-12 schools, supermarket/grocery stores, wholesale club/supercenters, hospitals, medical offices, senior care communities, hotels, residence hall/dormitories, offices, courthouses, wastewater treatment plants, worship facilities, retail stores, data

centers, distribution centers, non-refrigerated warehouses, and refrigerated warehouses. Certain [other criteria](#), such as minimum square footage and operating hours, may also apply.

If a property belongs to one of these categories, its owner or operator can obtain an Energy Star score for it. Based on the information entered about the building, such as its size, location, number of occupants, and number of computers, an algorithm estimates how much energy the building would use if it were the best performing building, worst performing building, and every level in between. It then compares the estimates to the actual energy usage data to determine where the building ranks relative to its peers, as reported in the DOE Energy Information Administration's Commercial Building Energy Consumption Survey. According to the EPA, all of the [calculations](#) are based on source energy (the total amount of raw fuel required to operate a building) and account for the impact of weather variations, as well as changes in key property use details.

Buildings that receive a score of at least 75 can [apply](#) for Energy Star certification online through the Portfolio Manager. They must have (1) entered data with complete use details (2) at least 12 consecutive months of energy data for all active meters, and (3) their applications verified and stamped by a licensed professional engineer or registered architect. The engineer or architect must verify the building's reported data such as property use characteristics, square footage, energy data, and whether certain indoor environment criteria have been met. Once the application is submitted, the EPA may also contact the building's owner or operator with additional questions and requests. Additional information on how to apply for Energy Star certification can be found at [http://www.energystar.gov/buildings/sites/default/uploads/tools/EnergyStar\\_HowToApply\\_508-121313.pdf?dfb3-54e6](http://www.energystar.gov/buildings/sites/default/uploads/tools/EnergyStar_HowToApply_508-121313.pdf?dfb3-54e6).

Energy Star certifications are good for one year and recipients must reapply annually to maintain a building's certification.

### ***Design to Earn Energy Star***

EPA also grants a "Designed to Earn the Energy Star" designation to newly constructed buildings that are expected to qualify for Energy Star certification once they become operational. To receive the designation, the architects and engineers who design the new building must use third-party modeling software to estimate the building's energy use, then enter the estimations and information about the building into the Portfolio Manager or Energy Star [Target Finder](#). Similar to the Portfolio Manager, Target Finder is a free online tool that can, among other things, project future Energy Star scores.

If the building's projected Energy Star score is at least 75, and the building is one of the same types eligible for an Energy Star score and certification, the project's architect can apply for a "Designed to Earn the Energy Star designation." The architect must submit:

1. a [statement of energy design intent](#) that includes the design energy inputs and results data generated by the Portfolio Manager or Target Finder;
2. letters of intent from the [architect of record](#) and [owner](#) that signify that the project is expected to earn an Energy Star score of at least 75; and
3. a [Service and Product Provider Partnership Agreement](#) in which the owner or operator agrees to (a) measure, track, and benchmark energy performance, (b) develop and implement a plan to improve energy performance and adopt the Energy Star strategy, and (c) educate staff and the public about the partnership and achievements with Energy Star.

For additional information on the "Designed to Earn the Energy Star" designation application, see: <http://www.energystar.gov/buildings/facility-owners-and-managers/new-construction/design-earn-energy-star>.

## **LEED CERTIFICATION**

The USGBC's LEED certification program recognizes a broad variety of "green" building strategies and practices. Building projects can qualify for LEED certification under one of five rating systems: building design and construction, interior design and construction, building operations and maintenance, neighborhood development, or homes. To receive certification, a project must earn credits within the appropriate rating system by meeting certain prerequisites and other optional goals. There are four levels of certification, depending on how many credits a project earns: Certified (40-49 points), Silver (50-59), Gold (60-79), and Platinum (80+).

### ***Prerequisites and Credits***

Each rating system contains nine credit categories: integrative process; location and transportation; materials and resources; water efficiency; energy and atmosphere; sustainable sites; indoor environmental quality; innovation; and regional priority credits. To be certified, a building project must meet certain minimum requirements in particular categories and can choose which additional credit earning improvements to make in order to accumulate the credits needed for the desired certification level.

For example, within the building design and construction rating system's [energy and atmosphere credit category](#), a project must:

1. complete certain commissioning process activities for mechanical, electrical, plumbing, and renewable energy systems in accordance with the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC&R Systems;
2. demonstrate a 5% improvement (for new construction) in the proposed building performance rating compared with the baseline building performance rating or comply with certain provisions of [ANSI/ASHRAE/IESNA Standard 90.1-2010](#);
3. install new or use existing building-level energy meters, or submeters that can be aggregated, to provide building-level data representing total building energy consumption and commit to sharing the resulting energy consumption data and electrical demand data with USGBC for a five-year period; and
4. not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration systems.

The project can then earn up to: six points for following certain additional enhanced commissioning procedures; 18 points for certain practices to optimize energy performance; one point for advanced energy metering; two points for demand response initiatives; three points for renewable energy production; one point for enhanced refrigerant management; and two points for contracting to purchase green power, carbon offsets, or renewable energy certificates.

The same project would also have to meet various requirements in the other credit categories, such as (1) reducing outdoor water use through certain measures to meet [water efficiency requirements](#), (2) developing and implementing a construction and demolition waste plan to meet [material and resources requirements](#), and (3) installing ventilation systems that meet minimum indoor air quality standards to meet [indoor environmental quality requirements](#). It could then accumulate credits in these categories by implementing additional measures such as installing certain fixtures and fittings that reduce indoor water use, reusing existing building resources or demonstrating a reduction in materials use through life-cycle assessment, or encouraging the use of natural lighting by providing manual or automatic glare-control devices. Applicants must meet various documentation and verification requirements specific to each prerequisite and optional credit.

To apply for LEED certification, applicants must first register their project with [LEED Online](#). Certified projects must be recertified every five years. Additional details on LEED certification prerequisites and available credits for each of the rating systems and credit categories can be found at <http://www.usgbc.org/credits>.

## **FINANCIAL COSTS AND BENEFITS**

Because Energy Star certification focuses on a building's relative energy efficiency while LEED certification encompasses a wide range of "green" initiatives, it is difficult to directly compare the financial costs and benefits of one certification with the other. Although we were unable to find any definitive third-party studies directly comparing the initial costs of the two certifications, presumably, pursuing LEED certification will cost more than Energy Star certification simply because LEED requires incorporating non-energy-related design features and upgrades that an Energy Star project would not require. This assumption may prove particularly true for projects certified in the LEED building operations and maintenance rating system (for existing buildings), which [requires](#) eligible buildings to qualify for an Energy Star rating of at least 75. Thus, these buildings must be eligible for Energy Star certification before adding in any other LEED-related improvements and costs. (On the other hand, a LEED certified new construction project must meet certain energy efficiency engineering and design standards, but could choose to deemphasize energy efficiency and instead accumulate certification credits in other areas.)

The extent to which the initial investment in Energy Star or LEED certification-related measures is repaid depends on each specific project. [According to the EPA](#), Energy Star certified buildings use, on average, 35% percent less energy than similar buildings. Certified office buildings cost \$0.50 less per square foot to operate than their non-certified peers. Energy efficiency returns in LEED certified buildings can vary more widely, however, because of the LEED system's variability. Presumably, those certified in the building operations and maintenance rating system will have at least the same energy efficiency as Energy Star buildings because the LEED system incorporates Energy Star eligibility as a prerequisite. Building projects in other LEED rating systems, however, may choose to stress non-energy-related improvements to achieve certification. Compared to Energy Star, this choice may reduce investment returns from energy efficiency but lead to increased returns in other areas (e.g., [worker productivity](#)) that Energy Star certification would not necessarily impact.



Both types of certification can also lead to other financial benefits, particularly for commercial buildings. A [2008 study](#) found that Energy Star certified buildings rent for \$2.40 per square foot more, have a 3.6% higher occupancy rate, and sell for \$61 per square foot more than their noncertified peers. The same study found that LEED certified buildings rent for \$11.33 more per square foot, have a 4.1% higher occupancy rate, and sell for \$171 more per square foot than non-LEED buildings. These figures imply that although LEED certification may initially cost more than Energy Star certification, it can also provide greater financial returns under certain circumstances. Presumably, higher rents, occupancy rates, and resale values would not be significant factors if the building was intended for governmental or other non-commercial uses.

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